easyRAID S8A2
(PCIe Host Interface)

42-30000-5106

PCIe to Serial ATA II

Disk Array System

Version 1.1

PCIe to Serial ATA II

Disk Array System

easyRAID S8A2 Software Manual

Preface

Notice

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Manual version 1.1

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About this manual

Thank you for choosing an RAID storage solution. This manual takes you step by step through the installation and configuration of the RAIDGuard X software.

PART ONE: Introduction

Chapter 1: Introduction provides an overview of the software and its features.

PART TWO: Software Installation

Chapter 2: Installing RAIDGuard X on Windows

Chapter 3: Installing RAIDGuard X on Mac OS

Chapter 4: Installing RAIDGuard X on Linux

PART THREE: Basic RAID Configuration

Chapter 5: RAIDGuard X Server

Chapter 6: Basic Configuration using RAIDGuard X Client

PART FOUR: Advanced RAID Configuration

Chapter 7: Advanced Configuration

PART FIVE: Appendices

Appendix A: Glossary – defines relevant technical terms used in this manual.

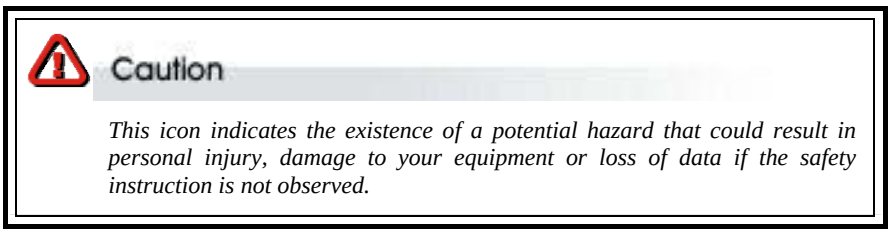
Appendix B: RAIDGuard X GUI Icons – lists the icons and their functions used in the application.

Appendix C: Introduction to RAID Levels – describes all available RAID levels available from this software.

Appendix D: Contact Us – lists contact details of business units around the world.

Guide to conventions

Important information that users should be aware of is indicated with the following icons:


Caution
This icon indicates the existence of a potential hazard that could result in personal injury, damage to your equipment or loss of data if the safety instruction is not observed.

Important terms, commands and programs are put in **Boldface** font.

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PART ONE

Introduction

Using this section

Part 1: The RAIDGuard X User Manual supplements the user's manuals supplied with easyRAID S8A2-PETT / easyRAID S8A2-PER2. It is intended to be read in a linear manner. Users may prefer to skip more familiar sections, but each of the steps below must be completed.

Step 1

Install: Install RAIDGuard X client and server on your system.

Step 2

Configure: Configure the RAIDGuard X Client to manage the RAID Arrays.

Step 3

Manage: Manage the RAID Arrays, fix problems and be alerted to any problems.

Note

The set-up procedures in Windows versions, MAC and Linux environments are different although the steps above are the same for both.

- ⇨ ***Windows** users should refer to **Chapter 2**.*
- ⇨ ***Apple Mac** users should refer to **Chapter 3**.*
- ⇨ ***Linux** users should refer to **Chapter 4**.*

Chapter 1

Introduction

This chapter introduces the features and capabilities of the RAIDGuard X software. You will find:

- ⇨ **A full introduction to your RAID system**
- ⇨ **Details of key features**

Overview

RAIDGuard X is a powerful tool which supports remote monitoring of multiple RAID system that are connected to the same network.

The software comes with 2 components: Server and Client.

Server - Enables the server to recognize the RAID system.

Client - The client software can be installed on any computer that needs to administer the RAID system.

The client software works on any computer running Java 1.5.09 or above and is used to administer RAID system. It contains all the functionality needed to configure and administer RAID arrays. Use the software to:

- add and delete arrays
- fix problems with disks
- manage the arrays and disks
- set audio and e-mail alerts
- monitor the status of multiple system

Key Features

RAIDGuard X is designed to be used in conjunction with easyRAID S8A2-PETT / easyRAID S8A2-PER2:

- Supports multiple easyRAID S8A2-PETT / easyRAID S8A2-PER2 per host
- Java Based Graphical User Interface (GUI)
- Multi-platform and Operating System support
- Remote monitoring
- Event notification
- Snapshot function

RAIDGUARD X CLIENT GUI

The graphical user interface enables easy monitoring of the status of a RAID in an intuitive format.

EVENT NOTIFICATION

Email event notification keeps the administrator informed of the status of the RAID system.

Remote Monitoring

The RAIDGuard X client must be installed on a Java-based computer in order to view the details of the RAID system away from the server.

Operating systems supported

Windows

Windows 2000			
Professional (SP4)	Server (SP4)	Advance Server (SP4)	
Windows 2003			
Server Enterprise Edition (SP1) (32/64 bits)	Server R2 Enterprise Edition(32/64 bits)	Enterprise Edition (SP1) (32/64 bits)	Server Edition
Others			
Windows XP Professional (SP2)	Windows Vista (32/64 bits)		

Mac OS X

OSX 10.4.7+ for Intel Xeon	OSX 10.4.7 + for PPC

Linux

Fedora			
core 5 for SMP platform	core 5 for none SMP platform	core 6 for SMP platform	core 6 for none SMP platform
Red Hat			
Enterprise 4 for SMP platform	Enterprise 4 for none SMP platform		
SUSE			
10.1 for SMP Platform (2.6.16.13-4 default)	SUSE 10.1 for none SMP Platform (2.6.16.13-4 default)		

Installation prerequisites

RAIDGuard X is designed to be used in conjunction with easyRAID S8A2-PETT / easyRAID S8A2-PER2 RAID system. Users require the following:

Hardware requirements

- CD-ROM drive
- Ethernet Connection (for remote monitoring)
- easyRAID S8A2-PETT / easyRAID S8A2-PER2 (installed)

Software requirements

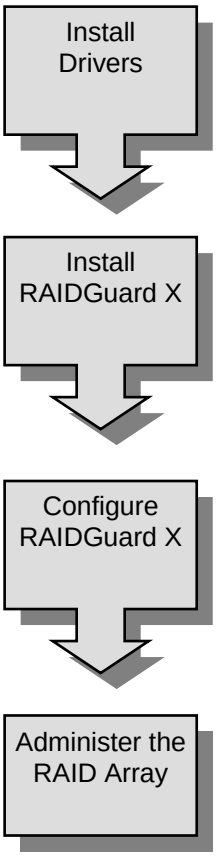
- RAIDGuard X GUI (follow the instructions in the relevant Setup section to download from the website **http://www.easyRAID.com**
- Supported operating system
- Java-based application environment

PART TWO

Software Installation

Installation flowchart

The set up process follows these steps:



- Install the appropriate driver.
- Install RAIDGuard X (Server or/and Client) on your host machine.
- Install RAIDGuard X (Client) on your workstation(s) for the remote connection.
- Launch RAIDGuard X Client on your host or workstation(s).
- Choose a target controller to configure.
- Configure controller settings, disk arrays preferences, email notifications, etc…
- RAIDGuard X (Client) can also be installed on workstations to remotely access this controller through the same network.

Chapter 2

Installing the driver and RAIDGuard X on Windows

This chapter details the installation, setup and configuration process for RAIDGuard X on a Windows operating system. RAIDGuard X client must be installed on each computer that will monitor or administer the RAID system.

Driver Installation

1. Insert the CD-ROM into the CD-ROM drive of the server or PC.
2. Execute “CD-ROM / Windows installer / Driver / (IA64.x32 and x64) / (2000, XP, 2003 and vista) / easyRAID_DR_Win_xxxxport_xx xx_1.5.0.0.msi”.
3. Follow the onscreen instructions.
4. Click Finish to complete the installation.

RAIDGuard X Installation

1. Insert the CD-ROM into the CD-ROM drive of the server or PC.
2. Execute “CD-ROM/Windows installer/GUI/ easyRAID_IP_Win_ 1.5.exe”.
3. Follow the onscreen instructions.
4. Select complete to install the server and client.
5. Select custom to choose which applications (client or server) to install when installing on a remote computer.
6. Click Finish to complete the installation.
7. Restart the computers.

Note

Storport and miniport are new storage drivers created by Microsoft for Windows Server 2003 and future Windows® operating systems.

Chapter 3

Installing the driver and RAIDGuard X on MAC OS

This chapter details the installation, setup and configuration process for RAIDGuard X on the Mac operating system. RAIDGuard X client must be installed on each computer that will monitor or administer the RAID system.

Driver Installation

1. Insert the CD-ROM into the CD-ROM drive of the server or PC.
2. Execute "CD-ROM/MAC Driver/ easyRAID_DR_MAC_1.5.0 / easyRAID_DR_ MAC_1.5.0.pkg".
3. Follow the onscreen instructions.
4. Click Finish to complete the installation.

RAIDGuard X Installation

1. Insert the CD-ROM into the CD-ROM drive of the MAC.
2. Execute "CD-ROM/MAC Installation/ easyRAID_IO_MAC_1_5_0. mpkg".
3. Follow the onscreen instructions.
4. Select complete to install the server and client, when the controller is installed in this computer.
5. Select custom to choose which applications (client or server) to install when installing on a remote computer.
6. Click Finish to complete the installation.
7. Restart the computers.

Chapter 4

Installing the driver and RAIDGuardX on Linux

This chapter details the installation process for RAID Guide X Server and Client on a Linux operating system. RAIDGuard X client must be installed on each computer that will monitor or administer the RAID system.

Driver Installation

1. Insert the CD-ROM into the CD-ROM drive of the server or PC.
2. Open CD-ROM/Linux Installation folder.
3. Select your OS description .txt file, and follow the instructions.

RAIDGuard X Installation

1. Insert the CD-ROM into the CD-ROM drive of the server or PC.
2. Open CD-ROM/Linux Installation folder.
3. Select readme_GUI.txt description txt file, and follow the instructions.

PART THREE

Basic RAID Configuration

Chapter 5
RAIDGuard X Server

The RAIDGuard X Server is responsible for communicating with the RAID system, its purpose is to identify that the RAID system is connected to the server.

Windows

Once installed the RAID Server will look for available RAID Cards and display the following message. Click **OK** to clear it.

An icon will be added to the windows notification area. **Right click** on the icon to display the following options:

1. **Run at Windows Startup** – Uncheck to prevent RAIDGuard X Server from starting when Windows starts. (Default)
2. **Remove from Windows Startup** – Check to remove RAIDGuard X Server from the Windows startup menu.
3. **Exit** – Close RAIDGuard X Server.

> **Note**
>
> *If the server icon is not displayed go to **Start** > **Programs** > **easyRAID** > **RAIDGuard X** > RAIDGuard X **Server**. If the server isn't visible then reinstall the software.*

If a RAID card cannot be found the following message will be displayed. Click **OK** to clear it.

Mac Users

RAIDGuard X server will automatically load itself and run as a daemon program during Mac OS system startup.

Chapter 6

Basic Configuration using RAIDGuard X Client

This chapter details the basic usage of the RAIDGuard X Client. Use this application to administer RAID system. It covers such functionality as adding and removing systems and arrays and e-mailing alerts to administrators.

Starting

Before starting ensure that the RAID controller has been configured in the BIOS of the controller card. To start RAIDGuard X Client either click the desktop icon or go to **Start** > **Programs** > **easyRAID** > **RAIDGuard X** > **RAIDGuard X Client**.

The menu bar across the top contains the following functions:

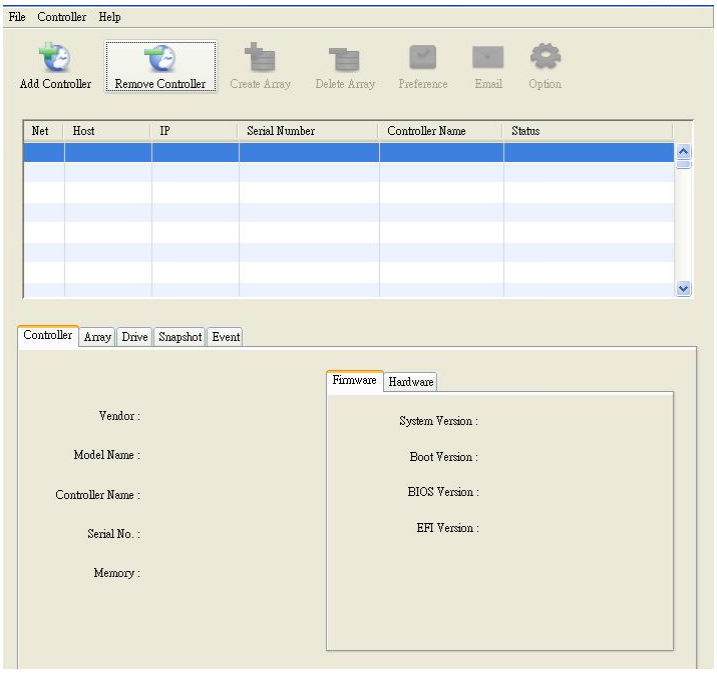
File –

Exit – Closes the program

Clear Log – Clear the event log

Note

*These events are automatically saved in **RAIDGuard X\Application\Log** as .txt files.*



Controller –

Update

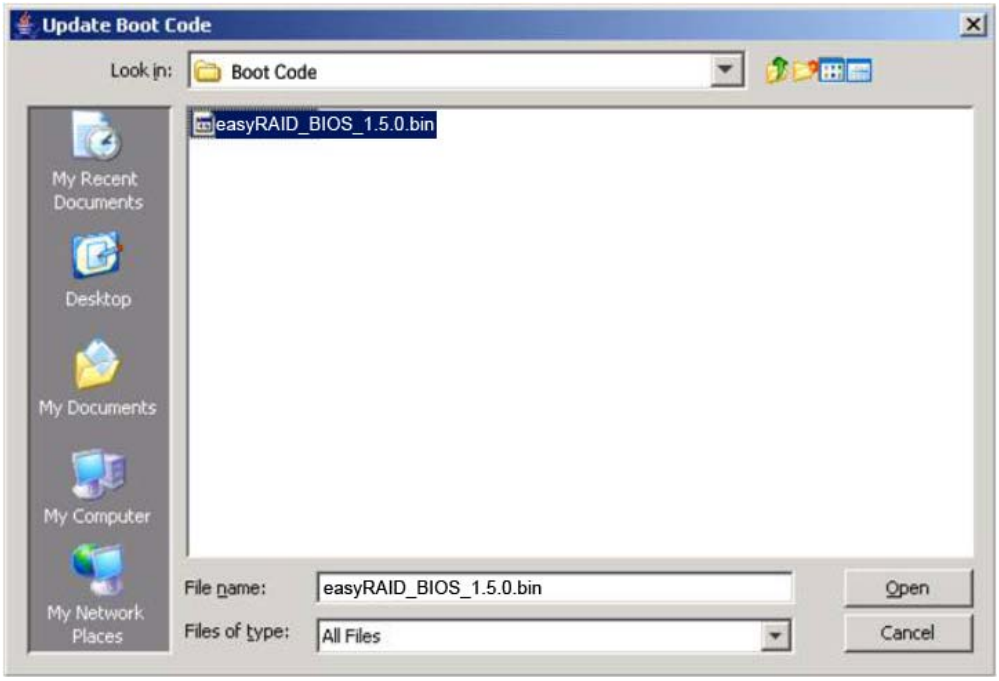
Update Firmware – Click to update the **firmware** of the controller card.

Update Boot Code – Click to update the **boot code** of the controller card.

Update BIOS & EFI – Click to update the **BIOS and EFI** of the controller card.

Caution

Before updating the firmware, Boot code or BIOS check the "Remove from Windows Startup" label under the windows server icon on the windows notification area.



Note

Do NOT unzip the gzip file before installation.

Help –

About RAIDGuard X RAID – Displays information about the RAIDGuard X version.

Help Center – Displays the help for RAIDGuard X.

Adding and Removing Controllers

In order to administer a controller it first needs to be added to the network. Once added the administrator is given full control over the controller.

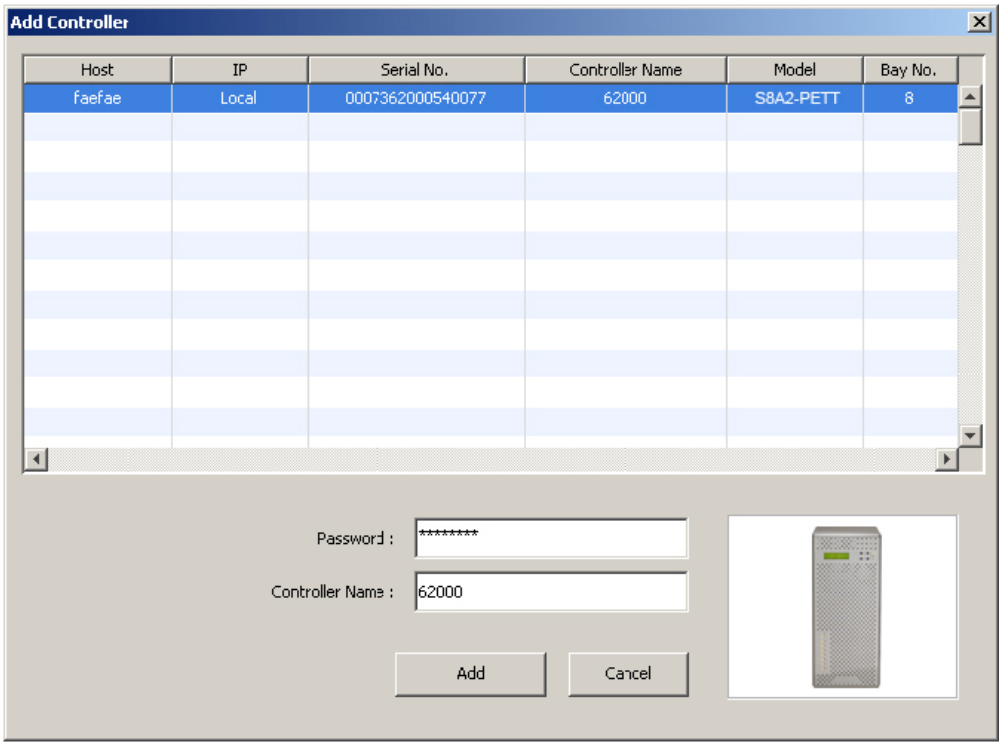
Adding

Click the **Add Controller** button to display a list of available controllers on the network. Click on the one to administer, enter the password (the default password for the easyRAID S8A2-PETT / easyRAID S8A2-PER2 is 00000000 (8 zeros)) and click **Add**.

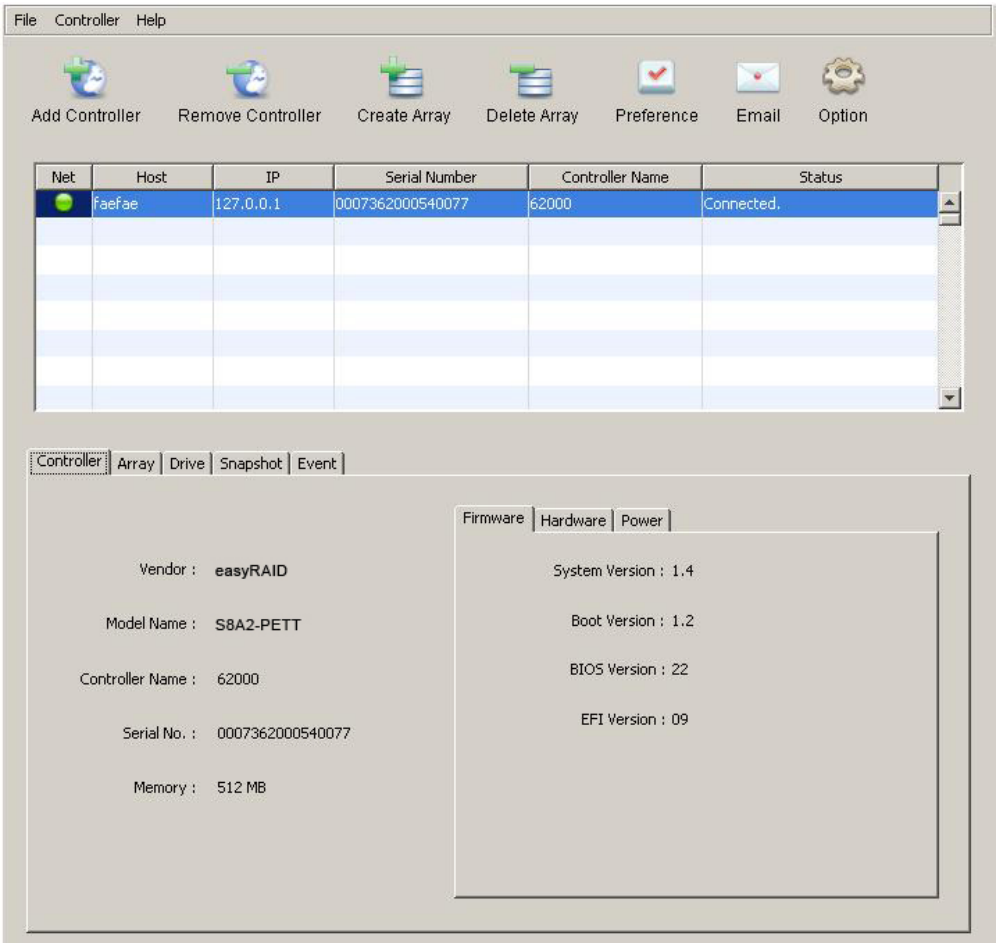
Controller Name

A Controller's nick name. You can assign a name to the controller.

> **Note**
>
> *The maximum number of controllers that can be displayed is 100.*

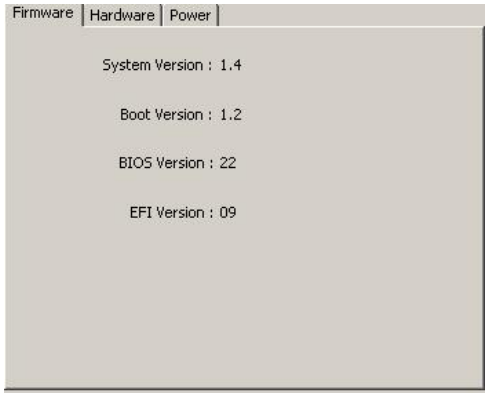


Once the controller has been added the following screen is displayed the 5 tabs: Controller Info, Array, Drives, Snapshot and Events are populated.

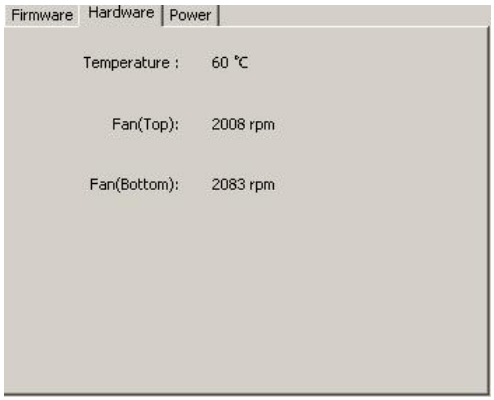


RAID System Info

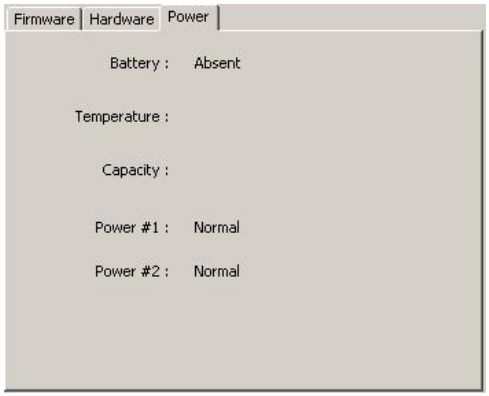
The controller info tab provides details on the Vendor, Model Name and Serial No. It also has 3 tabs: Firmware, Hardware and Power.



The **Firmware** tab details the System Version, Boot version, Bios version and EFI Version



The **Hardware** tab details the Controller Temperature and fan speed.

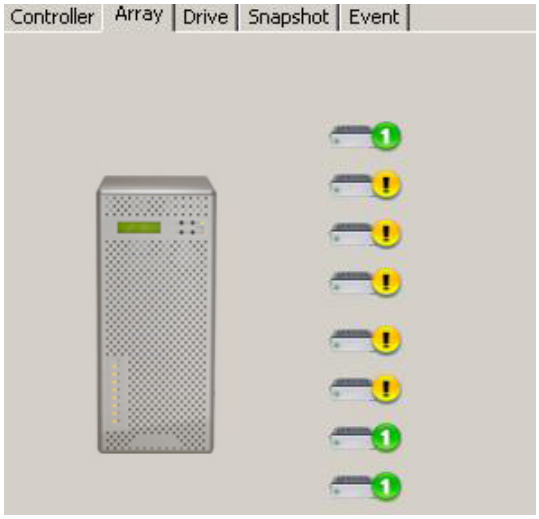


The **Power** tab details battery status and power status.

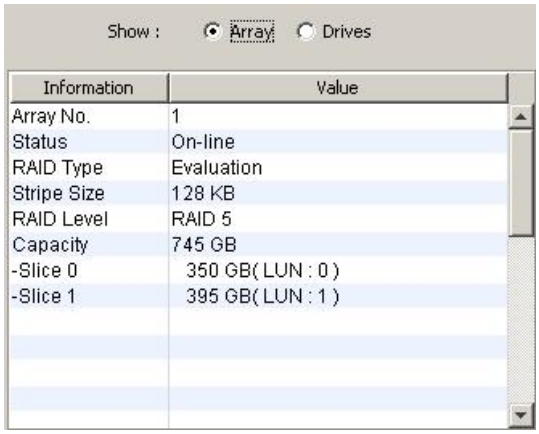
Array

The Array & Drives tab provides details on the status of the drives, eg which array they are assigned to. It also has 2 radio buttons: Array and Drives.

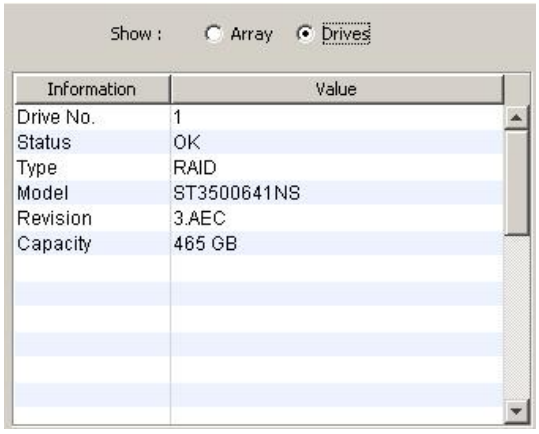
The image opposite will change depending on whether the easyRAID S8A2-PETT / easyRAID S8A2-PER2 is installed. The number above the drive displays the array number.



Clicking the **Array** radio button displays information about the array: The Array No., Status, RAID Type, Stripe Size, RAID Level, Capacity and Slice.

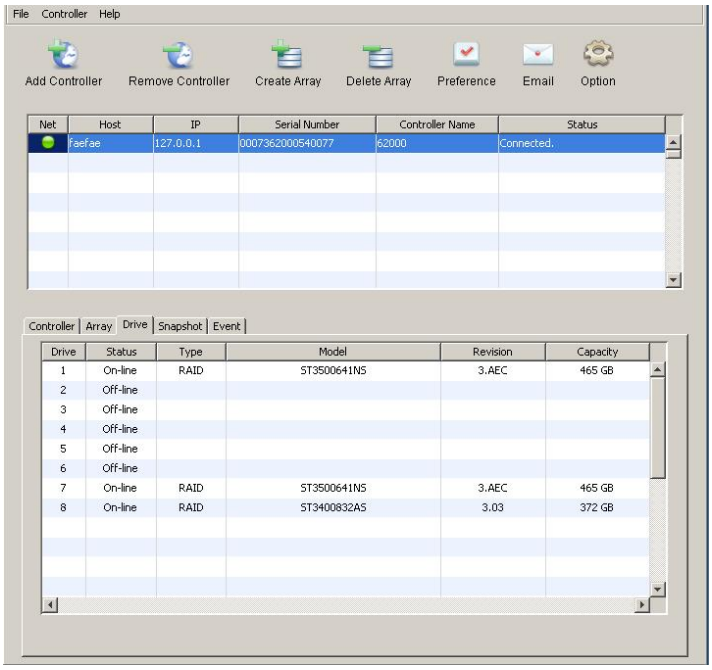


Clicking the **Drives** radio button displays information about individual drives. Click on each drive image to see its details: Disk No., Status (OK or Failed), Type (RAID or Spare), Model, Revision and Capacity.



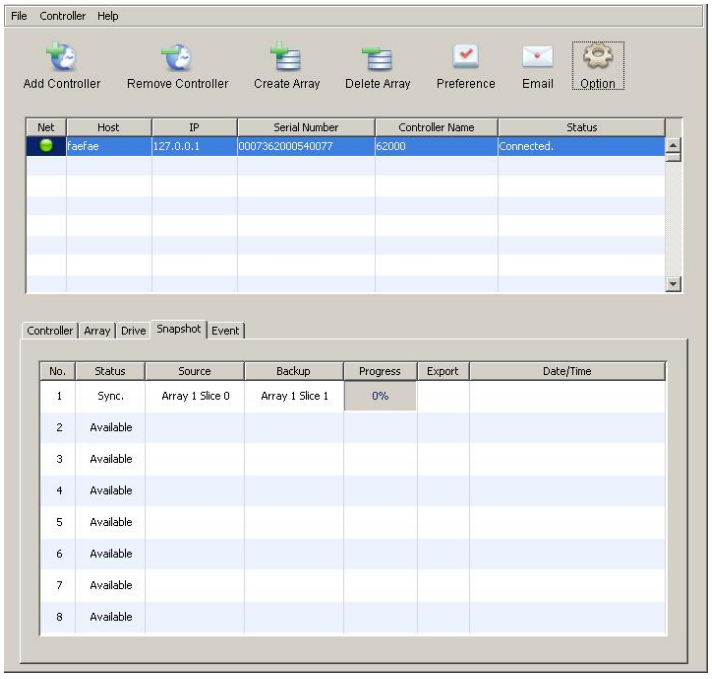
Drive

Display the overview of all disks.



Snapshot

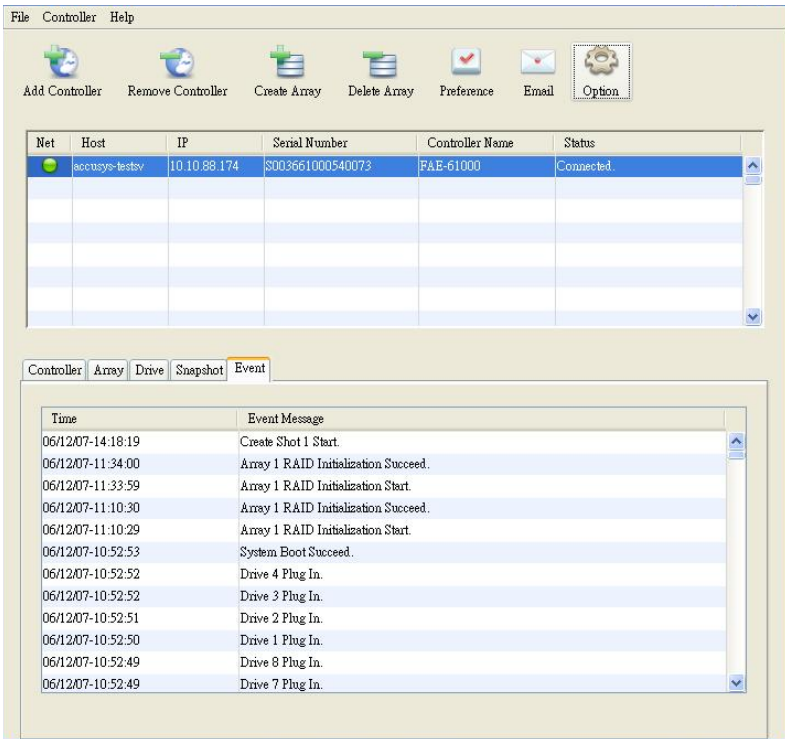
The progress of the snapshot is displayed in the snapshot tab. To enable the snapshot function see **Options** > **Snapshot.**



Events

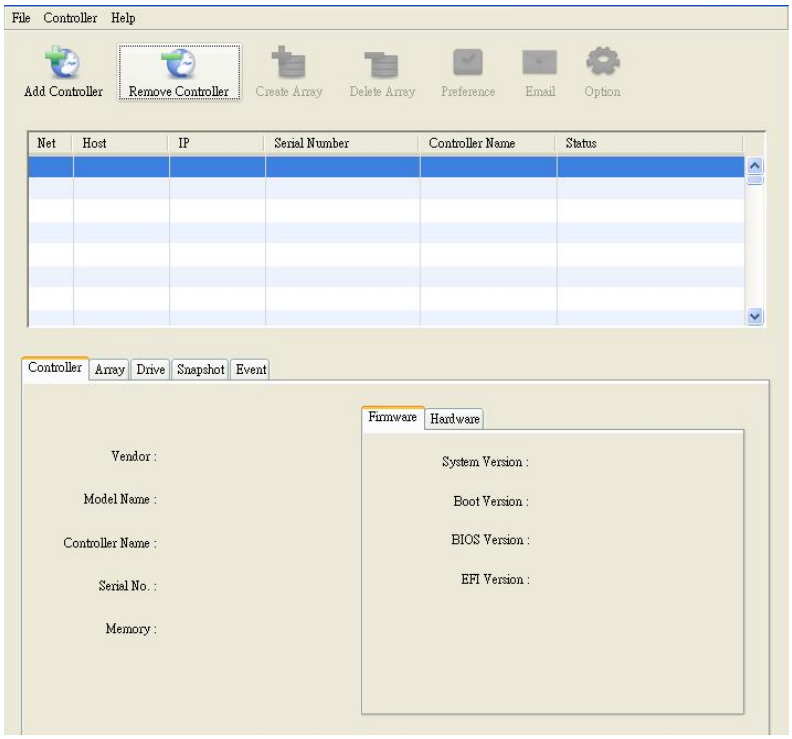
Displays a list of the most recent events. These events are automatically saved in **C:\ Program Files\ easyRAID\ RAIDGuard X\ Client\ Log** as .txt files.

To clear the log click **File** > **Clear Log**.


File Controller Help
Add Controller
Remove Controller
Create Array
Delete Array
Preference
Email
Option
Net Host IP Serial Number Controller Name Status
accusys-testsv 10.10.88.174 S003661000540073 FAE-61000 Connected.
Controller Array Drive Snapshot Event
Time Event Message
06/12/07-14:18:19 Create Shot 1 Start.
06/12/07-11:34:00 Array 1 RAID Initialization Succeed.
06/12/07-11:33:59 Array 1 RAID Initialization Start.
06/12/07-11:10:30 Array 1 RAID Initialization Succeed.
06/12/07-11:10:29 Array 1 RAID Initialization Start.
06/12/07-10:52:53 System Boot Succeed.
06/12/07-10:52:52 Drive 4 Plug In.
06/12/07-10:52:52 Drive 3 Plug In.
06/12/07-10:52:51 Drive 2 Plug In.
06/12/07-10:52:50 Drive 1 Plug In.
06/12/07-10:52:49 Drive 8 Plug In.
06/12/07-10:52:49 Drive 7 Plug In.

Removing

To remove a controller, select a controller and then click the **Remove Controller** button to remove the controller from the table.



Creating and Deleting Arrays

Administrators can choose how best to distribute the disks available. Once an array has been created it can be further administered in the **Options** section.

Creating and Array

When the RAID system is first configured an Array needs to be setup. This array tells the RAID system how many disks to use and what their function should be. The easyRAID S8A2-PETT / easyRAID S8A2-PER2 support the following RAID levels 0, 1, 5, 6, 0+1 and JBOD.

Follow the steps below to create an array:

Step 1: Select the RAID level from the drop down menu. Available levels are: 0, 1, 5, 6, 0+1 and JBOD. Each level has a minimum disk requirement and this is shown in the information to the right of the drop down list.

> **Note**
>
> *Details on the RAID levels are in **Appendix C Introduction to RAID Levels**.*

Step 2: Select the stripe size from the drop down menu. Available stripe sizes are: 4-256KB. The greater the stripe size the faster the I/O output for each drive. This speeds up disk access.

> **Note**
>
> *For an explanation of Stripe Sizes see **Appendix A Glossary**.*

Step 3: Click the drives to be added to the array.

> **Note**
>
> *The image displayed will vary depending on which controller is being used.*

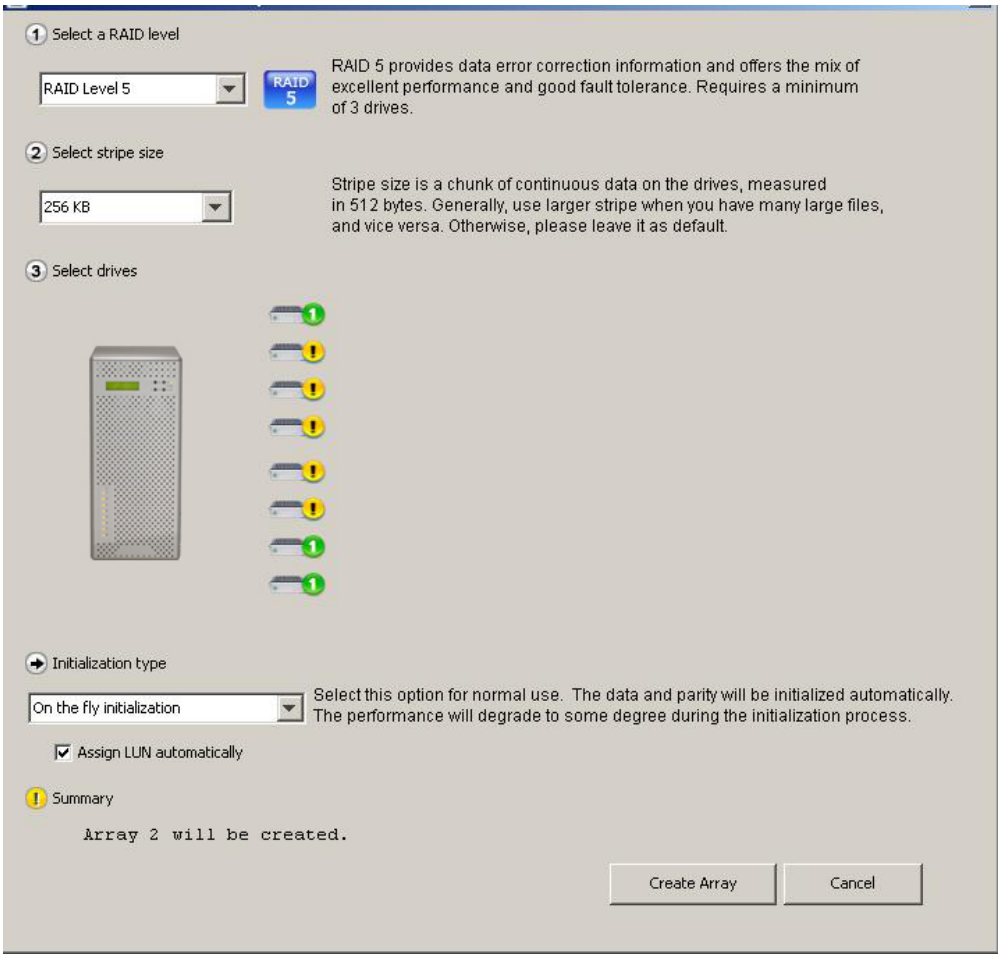
Optional: From the drop down menu select either On The Fly Initialization or Performance Evaluation.

> **On the Fly Initialization –** The default setting is for normal use. The data and parity will be initialized automatically. The performance will degrade to some degree during the initialization process.
>
> **Performance Evaluation –** Choose to evaluate the performance of the target array. Data and parity are not initialized. **(No data protection when this mode is on)**

To automatically assign a LUN check the box.

Summary: Informs on the Array to be created.

Click **Create Array** to complete the process.

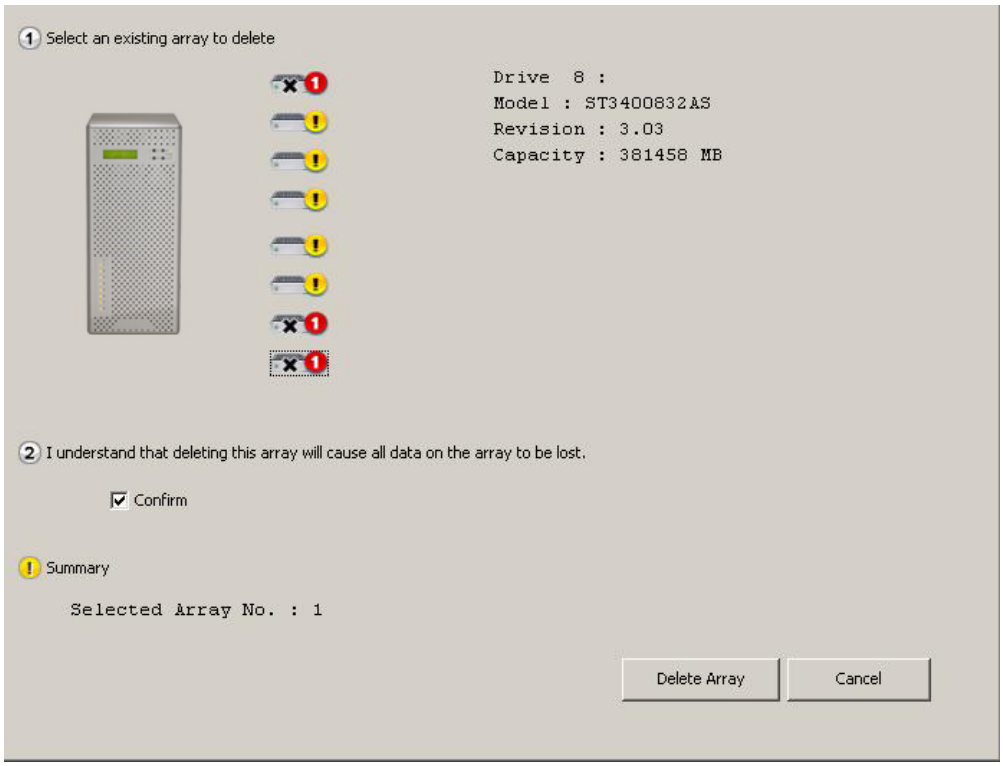

1 Select a RAID level
RAID Level 5
RAID 5 provides data error correction information and offers the mix of excellent performance and good fault tolerance. Requires a minimum of 3 drives.
2 Select stripe size
256 KB
Stripe size is a chunk of continuous data on the drives, measured in 512 bytes. Generally, use larger stripe when you have many large files, and vice versa. Otherwise, please leave it as default.
3 Select drives
Initialization type
On the fly initialization
Select this option for normal use. The data and parity will be initialized automatically. The performance will degrade to some degree during the initialization process.
Assign LUN automatically
Summary
Array 2 will be created.
Create Array
Cancel

Delete an Array

Deleting an array removes the selected array and allows the drives to be used in another array or reconfigured for a new array. Follow the steps to delete an array.

Step 1: Click on the disks containing the array to be deleted.

Step 2: Check the **Confirm** box when you understand that all the data on the disks will be lost. Click **Delete Array** to complete the process.


1 Select an existing array to delete
Drive 8 :
Model : ST3400832AS
Revision : 3.03
Capacity : 381458 MB
2 I understand that deleting this array will cause all data on the array to be lost.
Confirm
Summary
Selected Array No. : 1
Delete Array
Cancel

Email

It maybe necessary for network administrators to be send e-mails in the event of errors, alerts and changes to the RAID array. These alerts can be e-mailed to a maximum of 20 e-mail addresses.

Mailing List

Enter the e-mail address (es) of people to receive controller errors.

Click **Remove** to delete e-mail addresses from the list.

Click **Send Test Email** to check that the e-mail is working.

SMTP Setting

Mail Server Name - Enter the address of the mail server.

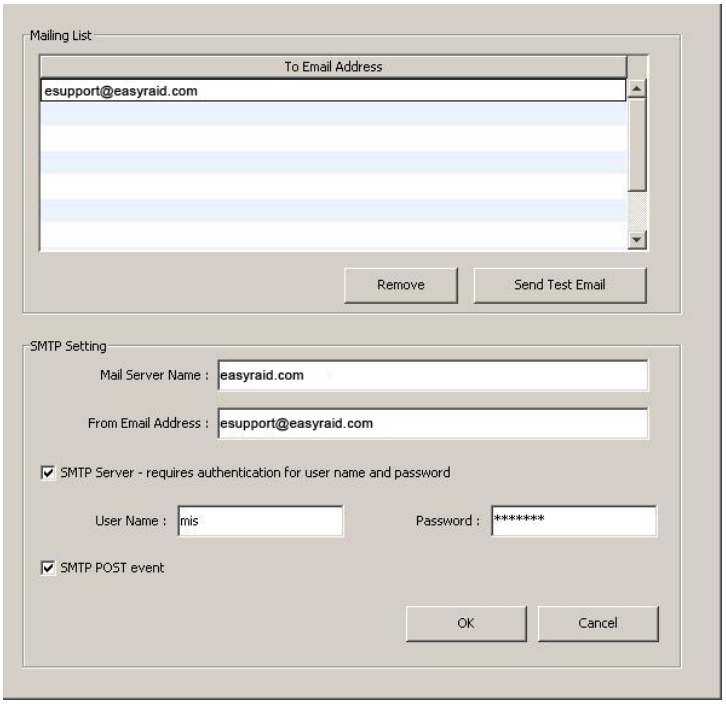
From E-Mail Address – Enter the e-mail address of the mail server.

SMTP Server Requires authentication…

Check this box if your mail server requires a username and password.

Note

Ask your systems administer for SMTP Server details.



PART FOUR

Advanced RAID Configuration

Chapter 7

Advanced Configuration

This chapter details the advanced usage of the RAIDGuard X Client. It covers such functionality as alarms and modes, slicing and expansion.

Preferences

The preferences button allows administrators to set the conditions of the controller such as performance modes, caching and miscellaneous functions.

There are 3 tabs under **Preferences**: **Mode**, **Cache** and **Misc.**.

Mode:

Disk Lag Proof Mode – Check this box to activate Disk Lag Proof Mode. A disk I/O lag on a single drive of a RAID set introduces delays in delivering data from an entire RAID set. Disk Lag Proof Mode limits these delays by regenerating data from parity and returns data to the host on time. In return for limiting the delays there is a minor performance loss when this mode is enabled.

Note

This function does not support JBOD and NRAID.

NCQ – Check this box to activate **N**ative **C**ommand **Q**ueuing. It allows several outstanding commands to be given to the drives at one time, therefore increasing the performance of the hard dives.

Note

*For an explanation of NCQ see **Appendix A Glossary**.*

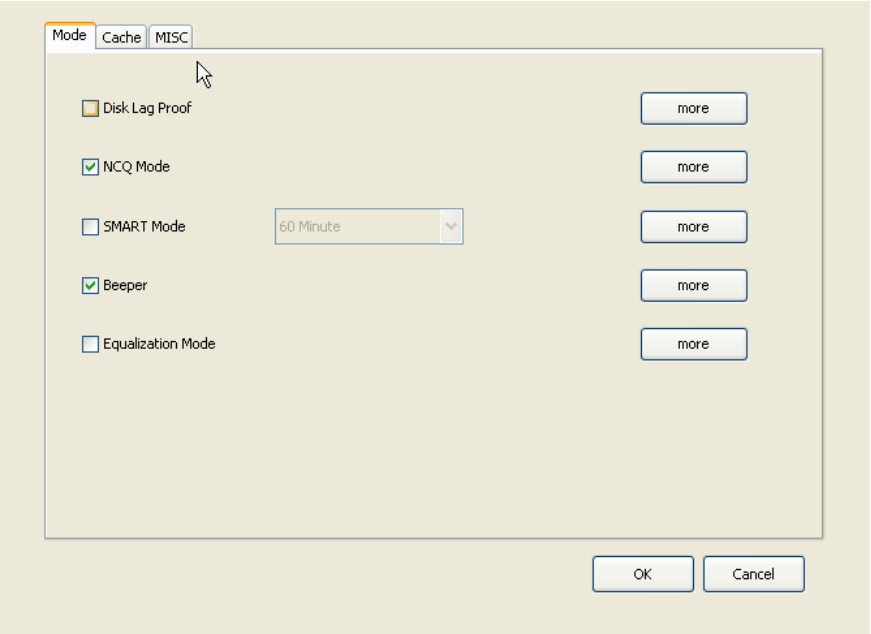
SMART Mode – Check this box to activate SMART Mode. Choose from 1 minute to 8 hours the number of minutes for SMART Mode to be active. SMART Mode monitors the performance of the hard drives to predict hard drive failure.

Note

For an explanation of SMART Mode see ***Appendix A Glossary****.*

Beeper – Sound an audible alarm on the controller in the event of an error.

Equalization Mode – Check this box to smooth the performance of sequential I/Os and reduce fluctuation (peak performance will be reduced). For video editing, enable equalization to prevent video frame drops.



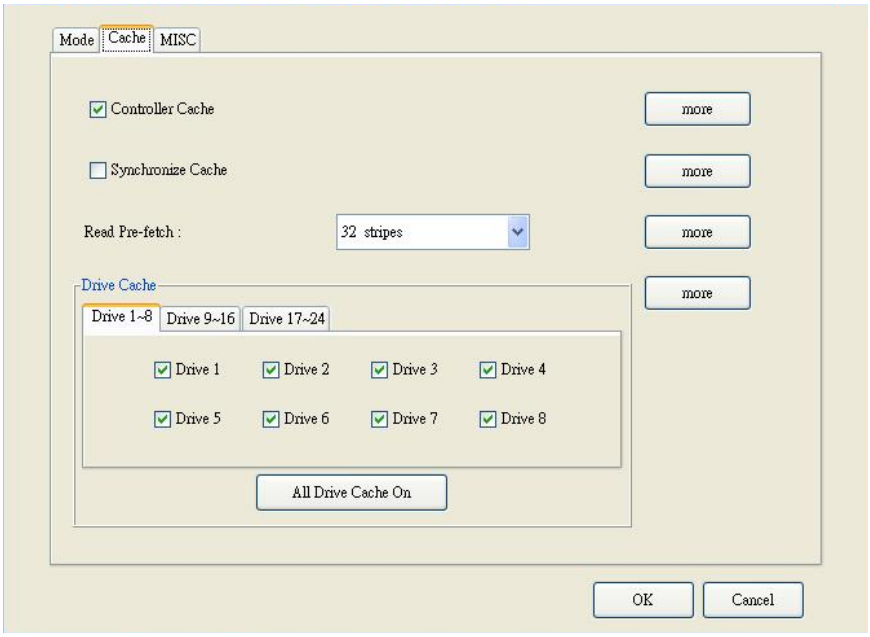
Cache:

Controller Cache – Check this box to enable the system cache. This speeds up the data transfer to and from the disks.

Synchronize Cache – Check this box to enable cache synchronization. When Synchronize Cache mode is disabled, the RAID system works correctly but does not actually perform any cache flushing. For video capture, disable synchronization because the video capture needs to be able to constantly write data to the RAID system without long SYNCHRONIZE_CACHE latency.

Read Pre-fetch – Identifies sequential access patterns and aggressively pre-fetches patterns into cache. From the drop down list choose the number of stripes to pre-fetch. The default is 32, this is the recommended number.

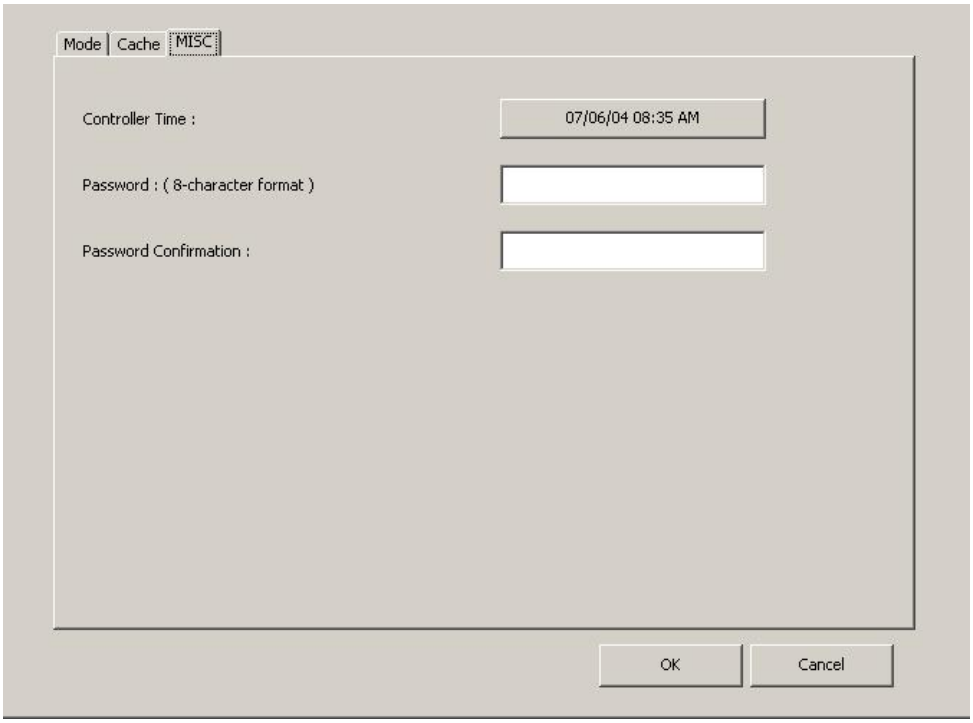
Drive Cache – Choose which drives to cache. When more than one application accesses the database the first applications cache needs to synchronize with the second. Each drive contains a built in write cache, checking these boxes chooses which drives to enable the caching on. Caching improves the efficiency and speed of data transfer.



MISC:

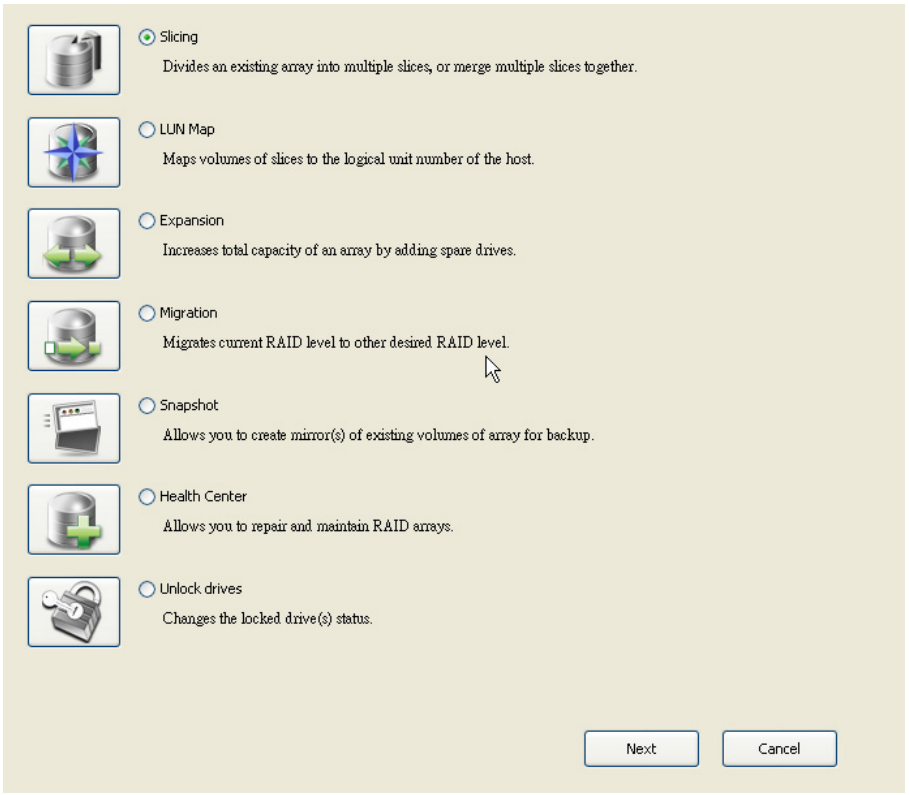
Controller Time – Click this button to see a calendar and to change the time of the controller.

Password – Enter the new controller password. The default password is 00000000 (8 zeros). Type another 8 characters.



Options

The Options menu provides the methods for changing the details of and fixing problems with the array. Click the required option and then click Next to proceed.

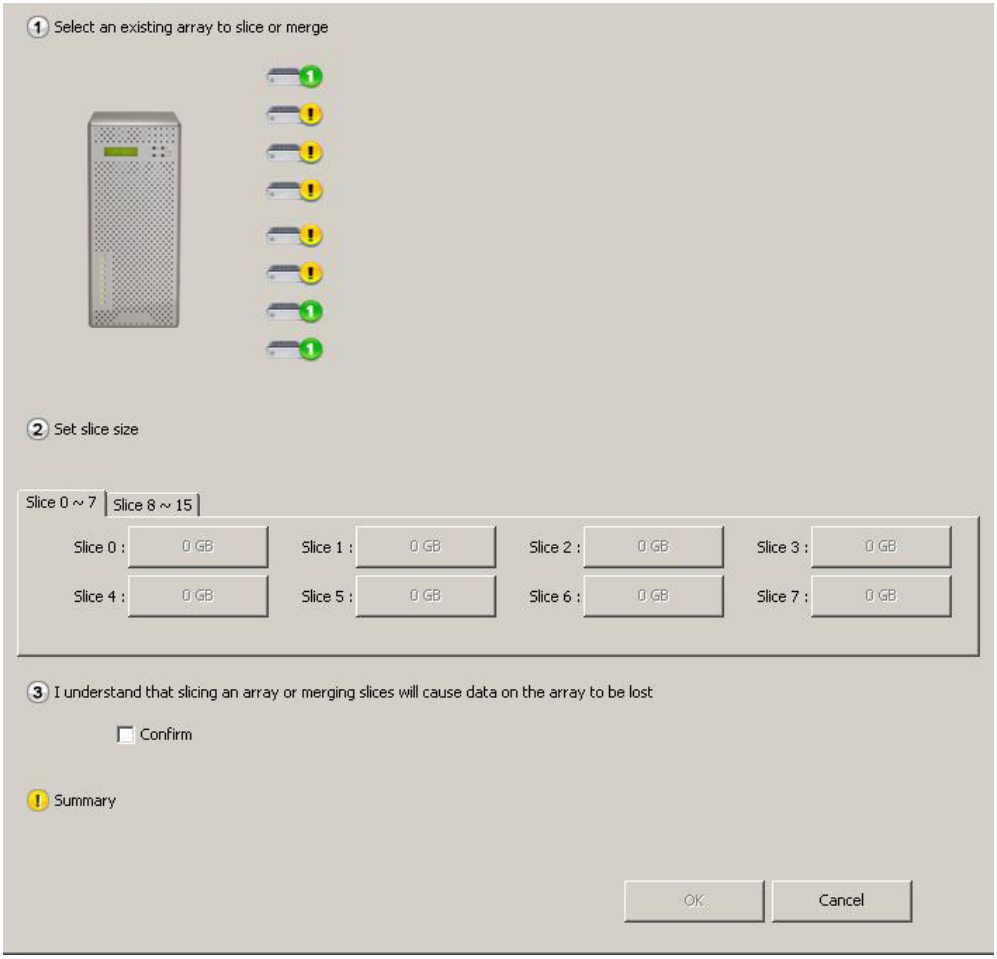

Slicing
Divides an existing array into multiple slices, or merge multiple slices together.
LUN Map
Maps volumes of slices to the logical unit number of the host.
Expansion
Increases total capacity of an array by adding spare drives.
Migration
Migrates current RAID level to other desired RAID level.
Snapshot
Allows you to create mirror(s) of existing volumes of array for backup.
Health Center
Allows you to repair and maintain RAID arrays.
Unlock drives
Changes the locked drive(s) status.
Next
Cancel

Slicing

Hard drive slicing, partitions the drives of an array so that it appears as a separate volume without reducing the speed.

Follow the steps below to select an array to slice or merge.

Step 1: Select the array to slice or merge by clicking on a disk with an array number.

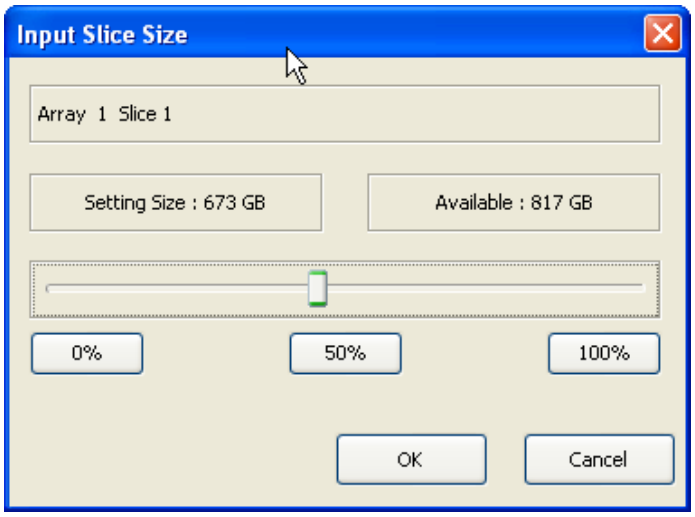

1 Select an existing array to slice or merge
2 Set slice size
Slice 0 ~ 7
Slice 8 ~ 15
Slice 0 : 0 GB
Slice 1 : 0 GB
Slice 2 : 0 GB
Slice 3 : 0 GB
Slice 4 : 0 GB
Slice 5 : 0 GB
Slice 6 : 0 GB
Slice 7 : 0 GB
3 I understand that slicing an array or merging slices will cause data on the array to be lost
Confirm
Summary
OK
Cancel

Step 2: Click the slice to create and use the slider bar or buttons to adjust the size. Click OK to complete.

Note

Slices must be adjusted in order ie Slice 0, Slice1, Slice 2 etc.

Each array supports a maximum of 8 slices.



Step 3: Check the **Confirm** box and then the **OK**.

LUN Map

A LUN is a unique identifier used on a SCSI bus that enables it to differentiate between up to eight separate devices. Use the LUN map to attach a unique identifier to a slice.

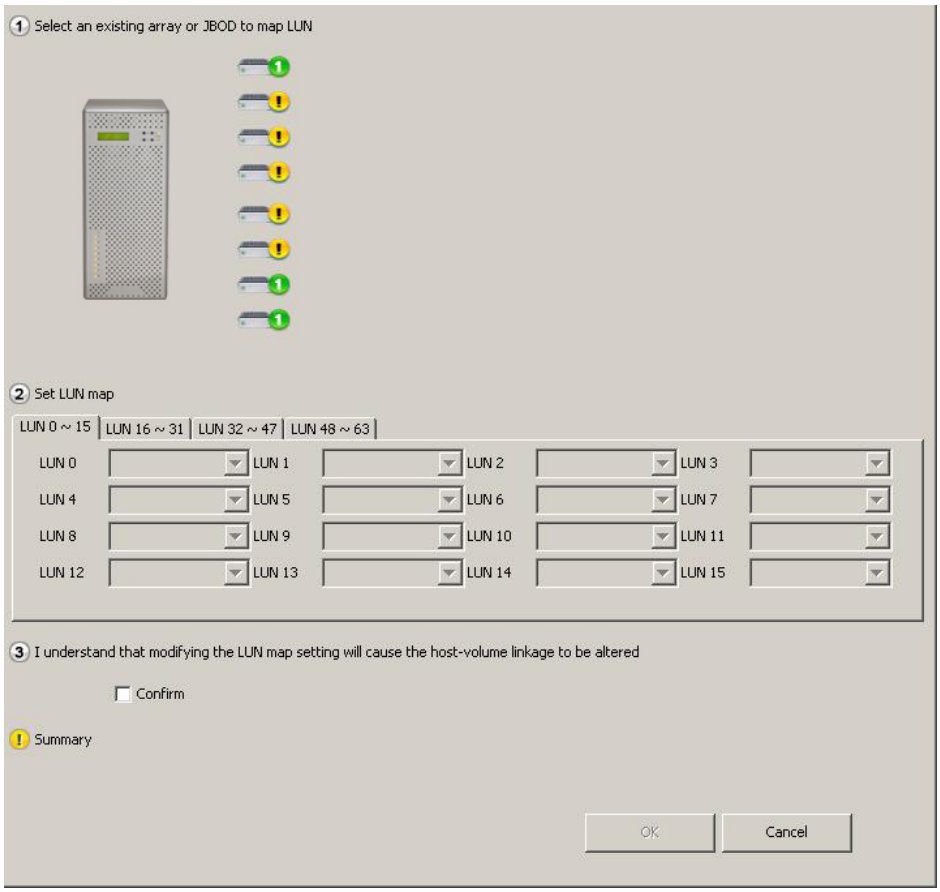
Follow the steps below to map a LUN.

Step 1: Select the Array to map.

Step 2: Choose a LUN and from the drop down list select a series to map to.

Step 3: Check the **Confirm** box and then **OK**.

> **Note**
>
> *For an explanation of LUNs see Appendix A Glossary.*



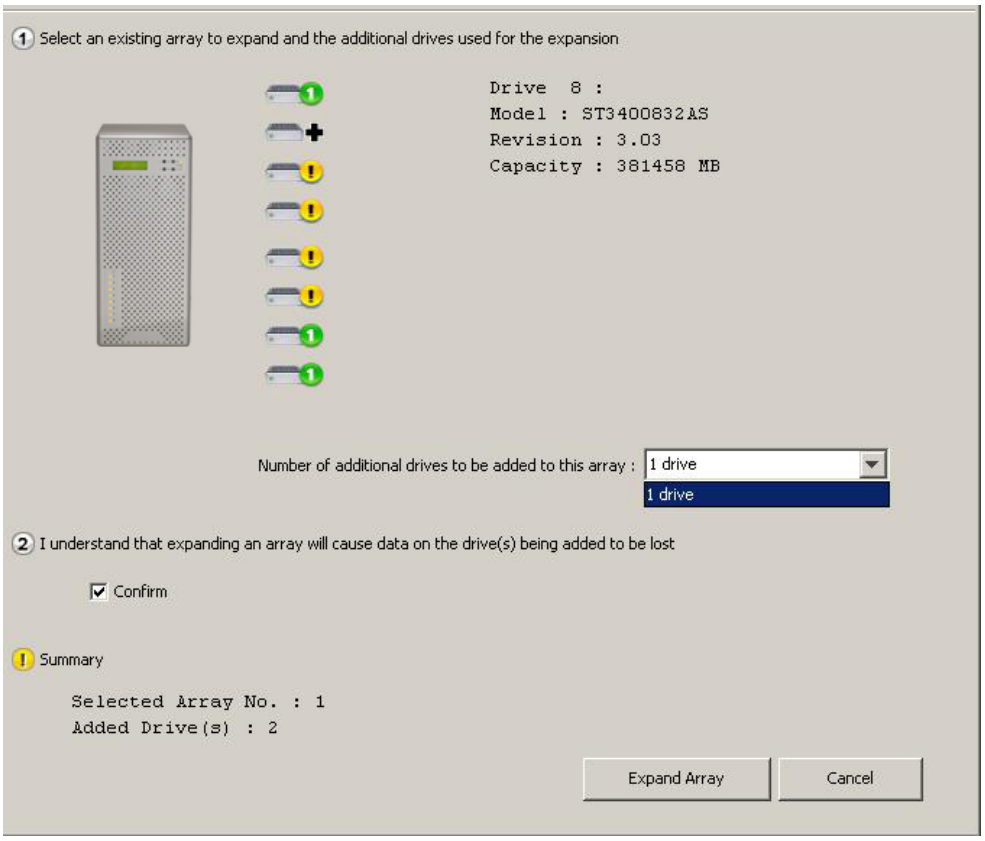
Expansion

Expansion allows the adding of extra drives to an array with the need to rebuild the array. This is carried out online without the need to stop data transfer.

Follow the steps below to select an array to expand.

Step 1: Select the array to add additional disks to and select the number of disks to be added. A "+" sign is added above the disk(s) to be added.

Step 2: Check the **Confirm** box and then **Expand Array**.


1 Select an existing array to expand and the additional drives used for the expansion
Drive 8 :
Model : ST3400832AS
Revision : 3.03
Capacity : 381458 MB
Number of additional drives to be added to this array :
1 drive
1 drive
2 I understand that expanding an array will cause data on the drive(s) being added to be lost
Confirm
Summary
Selected Array No. : 1
Added Drive(s) : 2
Expand Array
Cancel

Note

It is only the number of drives that can be chosen, not the specific disk.

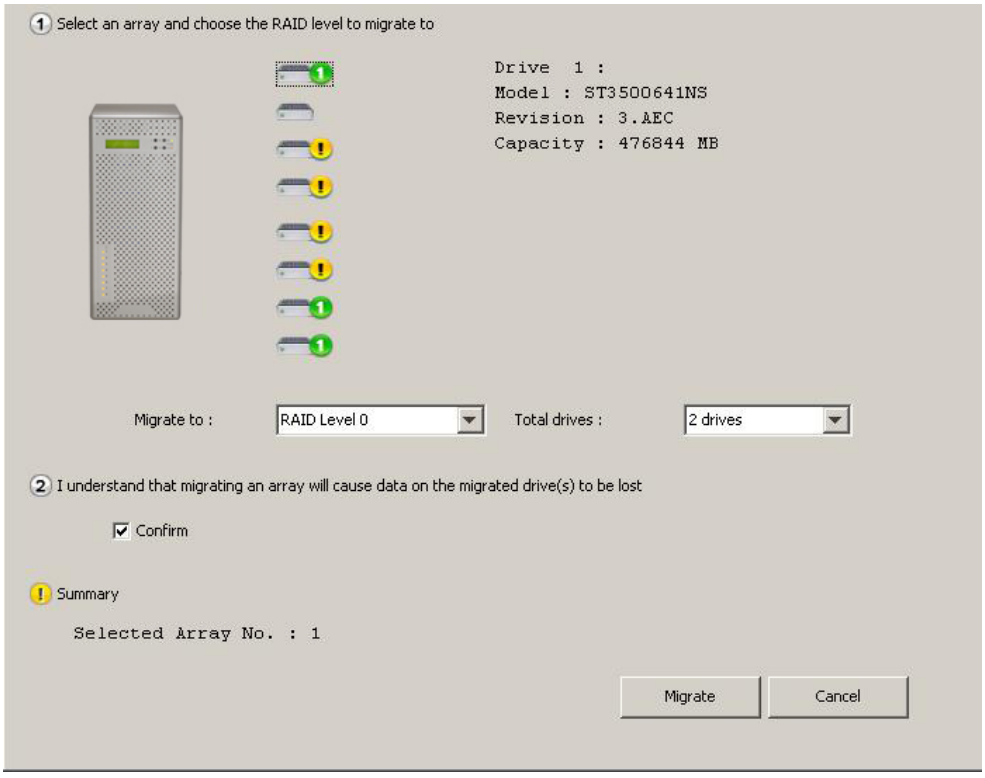
Migration

Migration allows RAID types to be changed without the need to delete the array and rebuild. This can be useful when new disks have been added and a new array type needs to be created.

Follow the steps below to select an array to migrate. This changes the RAID type eg from RAID 1 to RAID 5.

Step 1: Select the Array to migrate. From the drop down menu select the RAID Level to Migrate to then select the **Total Drives** to include in the array. A "+" sign is added above the disk(s) to be added and a "-"sign above the disk(s) to be removed.

Step 2: Check the **Confirm** box and then **Migrate**.


1 Select an array and choose the RAID level to migrate to
Drive 1 :
Model : ST3500641NS
Revision : 3.AEC
Capacity : 476844 MB
Migrate to :
RAID Level 0
Total drives :
2 drives
2 I understand that migrating an array will cause data on the migrated drive(s) to be lost
Confirm
Summary
Selected Array No. : 1
Migrate
Cancel

Snapshot

The snapshot function mirrors the data from one slice onto another thereby backing up the data. From the drop down menu select Create Shot, Delete Shot and Split Shot.

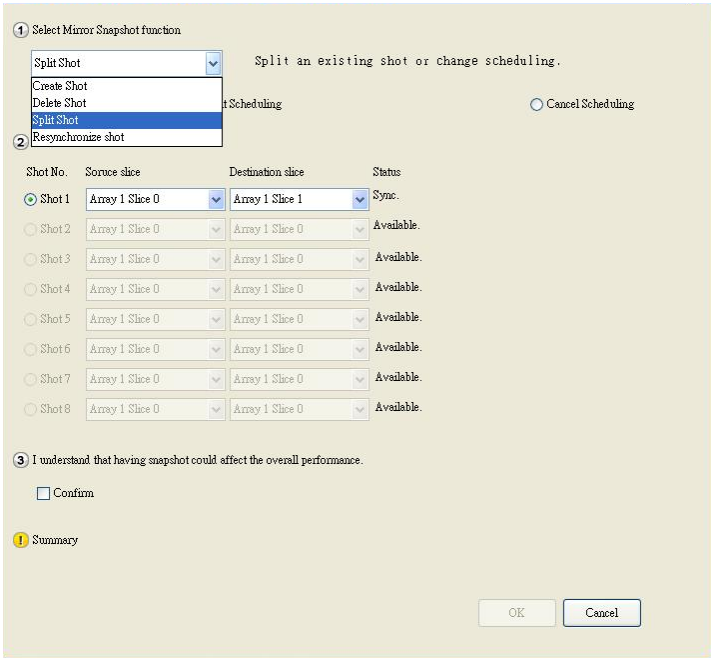
Create Shot

Creates a snapshot of the selected slice. A maximum of 8 shots can be created. Once all shots have been used, older shots must be deleted before new ones can be taken.

Step 1: Select the **Create Shot** function from the drop down menu.

Step 2: Select the required shot by clicking on the Shot No. radio button. From the respective drop down menus select the **Source Slice** and **Destination Slice**. Unavailable shots are greyed out.

Step 3: Check the **Confirm** box and then **OK** to take a snapshot.



Delete Shot

Deletes the selected shot.

Step 1: Select the **Delete Shot** function from the drop down menu.

Step 2: Select the required shot by clicking on the Shot No. radio button. From the respective drop down menus select the **Source Slice** and **Destination Slice**. Unavailable shots are greyed out.

Step 3: Check the **Confirm** box and then **OK** to delete a snapshot.

Split Shot

Split Now—

Splits the selected shot. The shot is split and read as two separate shots; therefore it becomes two separate slices after being split.

Step 1: Select the **Split Shot** function from the drop down menu.

Step 2: Select the Split Now radio button.

Step 3: Select the required shot by clicking on the Shot No. radio button. From the respective drop down menus select the **Source Slice** and **Destination Slice**. Unavailable shots are greyed out.

Step 4: Check the Check the **Confirm** box and then **OK** to split the snapshot.

Split Scheduling—

It can set any time to split shot.

Step 1: Select the **Split Shot** function from the drop down menu.

Step 2: Select the Split Scheduling radio button.

Step 3: Set split time.

Step 4: Select the required shot by clicking on the Shot No. radio button. From the respective drop down menus select the **Source Slice** and **Destination Slice**. Unavailable shots are greyed out.

Step 5: Check the Check the **Confirm** box and then **OK** to split the snapshot.

Cancel Scheduling—

Cancel the split shot scheduling.

Step 1: Select the **Split Shot** function from the drop down menu.

Step 2: Select the Cancel Scheduling radio button.

Step 3: Select the required shot by clicking on the Shot No. radio button. From the respective drop down menus select the **Source Slice** and **Destination Slice**. Unavailable shots are greyed out.

Step 4: Check the Check the **Confirm** box and then **OK** to split the snapshot.

Resynchronize shot

Resynchronize the selected shot. This function can speed up mirror for previously snap shot.

Step 1: Select the **Resynchronize shot** function from the drop down menu.

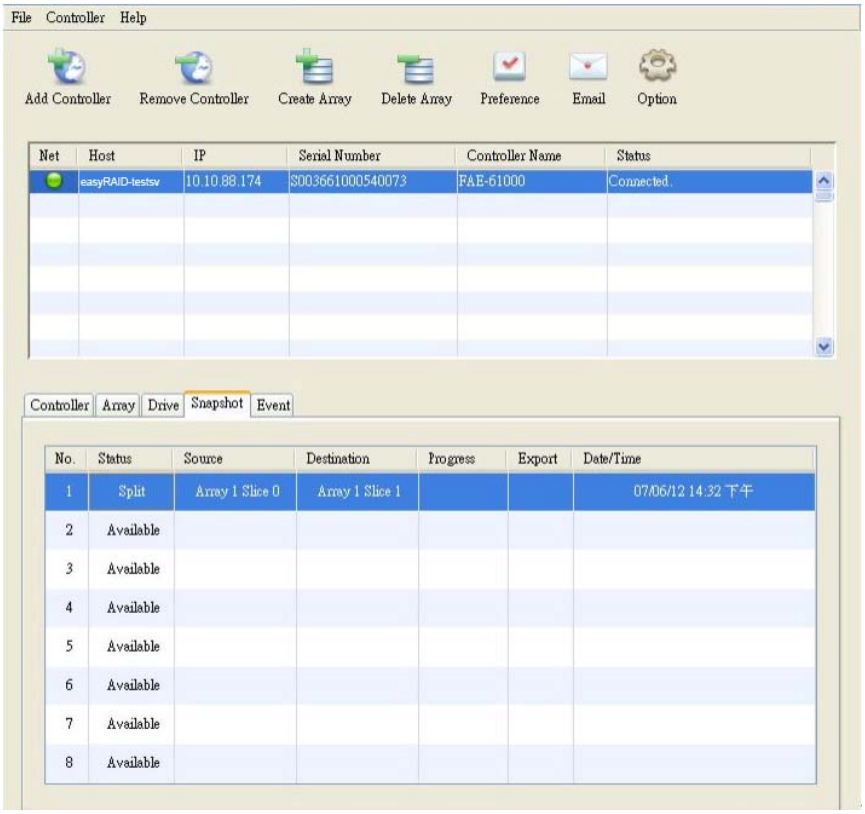
Step 2: Select the required shot by clicking on the Shot No. radio button. You only can select **splitting** shot for resynchronize.

Step 3: Check the Check the **Confirm** box and then **OK** to split the snapshot.

Note

1. *The destination slice must be larger than the source slice.*
2. *The Source Slice and the Destination Slice can be on different arrays.*
3. *The Destination Slice must NOT be mapped to a LUN.*
4. *A shot will not be deleted if the details of the array change. The only way to delete a shot is using the delete function under* ***Snapshot****.*

The progress of the snapshot is displayed in the snapshot tab of the front window.



Health Center

If there are problems with the array then the health center can help to resolve them.

Follow the steps below to select an array to verify, rebuild or condition.

Step 1: Select the Array to verify, rebuild or condition.

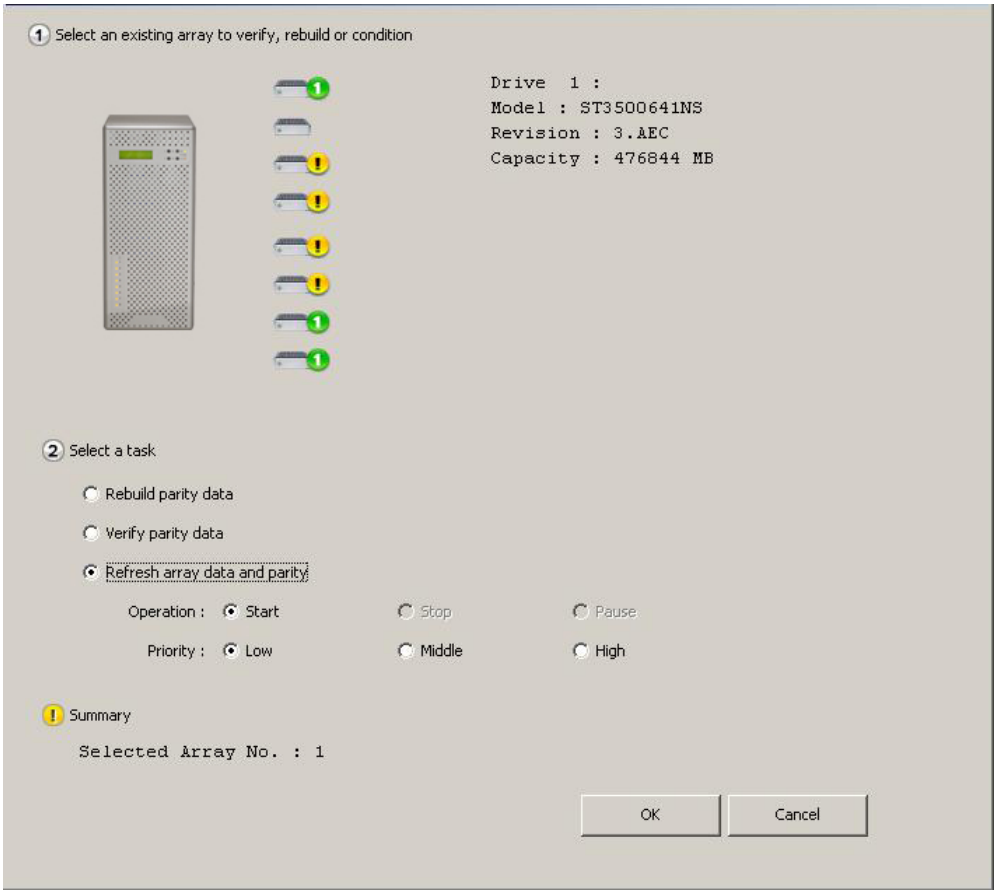
Step 2: Click the radio button to:

Rebuild parity data – Rebuilding parity on an array uses the data on the array to create new parity data not repair problems with the data.

Verify parity data – verification that the data is free of errors.

Refresh array data and parity. – If choosing Refresh array data choose the priority between Low, Med or High. It Scans, rewrites and scrubs bad data conditions caused by excessive vibration during disk I/Os or Adjacent Track Interference (ATI) that causes data degradation.

Step 3: Click **OK** to start the operation.



Unlock drives

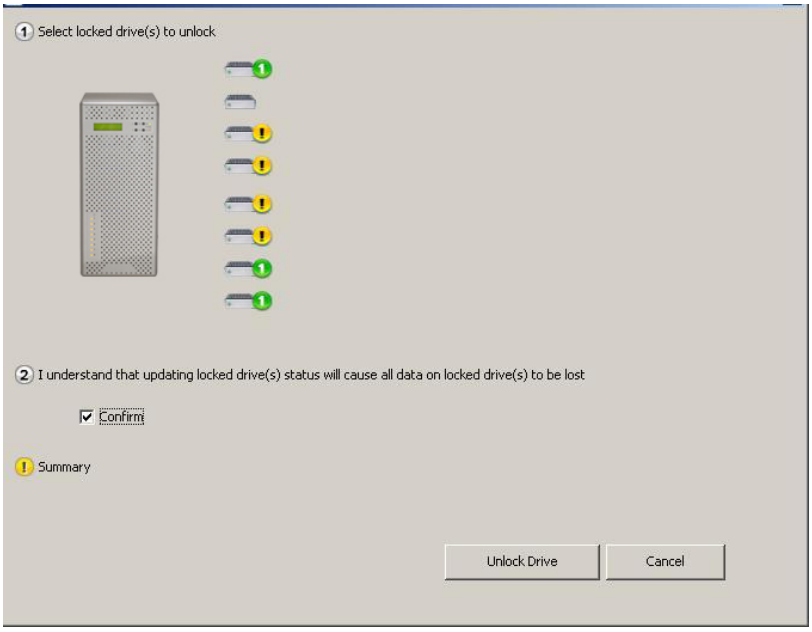
Locked drives are drives that for one reason or another have stopped being recognized by the controller.

Follow the steps below to select a drive to unlock or change the ID.

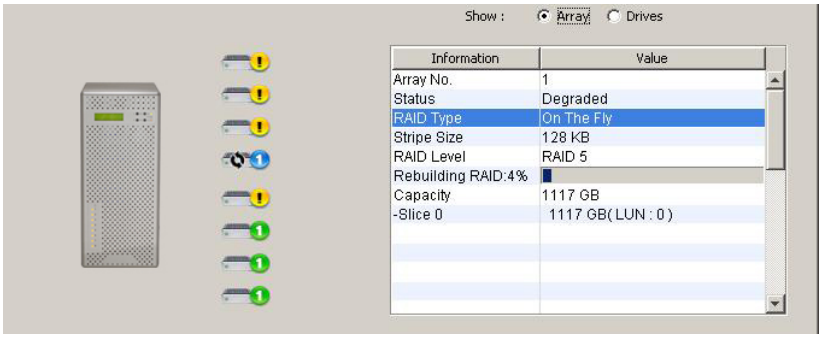
Locked drives prevent the accidental loss of user data when disk drives are installed one at a time, or a RAID member is accidentally removed while the system is powered-on. The meta-data and user data on the locked drives are preserved for online/offline recovery. If users don't need the data of the locked drive any longer, the locked drive can be changed into a spare drive by the command of Unlock Drive.

Step 1: Select the drive with the icon. It will change to the icon.

Step 2: Check the **Confirm** box and then **Unlock Drive**.


1 Select locked drive(s) to unlock
2 I understand that updating locked drive(s) status will cause all data on locked drive(s) to be lost
Confirm
Summary
Unlock Drive
Cancel

During rebuilding the following screen will be displayed.



PART FIVE

Appendices

Appendix A

Glossary

Array

See Disk Array.

Cache

Controller memory used to speed up data transfer to and from a disk.

Disk Array

A collection of disks from one or more commonly accessible disk controllers, combined with a body of Array Management Software. Array Management Software controls the disks and presents them to the array operating environment as one or more virtual disks.

Firmware

See Array Management Software.

Host Computer

Any computer system to which disks are directly attached and accessible for I/O. Mainframes, and servers, as well as workstations and personal computers, can all be considered host computers in the context of this manual, as long as they have disks attached to them.

LUN

A LUN (Logical Unit Number) is a unique identifier used on a SCSI bus that enables it to differentiate between up to eight separate devices (or logical unit). Each LUN is a unique number that identifies a specific logical unit, which may be an end user, a file, or an application.

Native Command Queuing (NCQ)

NCQ allows several outstanding commands to be given to the drives at one time. The commands are carried out in sequence instead of the order they are given. Rather like pressing buttons in a lift, the lift goes to the next floor in the list not the order that the buttons are pressed. This speeds up the disk access and reduces the load on the drives.

Parity

Parity information is redundancy information calculated from actual data values. If any single piece of data is lost, the remaining data and the parity information can be used together to calculate the lost data. Parity information can either be stored on a separate, dedicated drive, or be mixed with the data across all the drives in the array.

RAID (Redundant Array of Independent / Inexpensive Disks)

A disk array in which part of the storage capacity is used to store redundant information about user data stored on the remainder of the storage capacity. The redundant information enables regeneration of user data in the event that one of the array member disks or the access path to it fails. See Parity. Different RAID levels offer different data throughput speeds and fault tolerance (data redundancy). RAID 0 does not feature redundant information but is nonetheless considered a type of RAID.

SMART (Self-Monitoring, Analysis and Reporting Technology) Mode

SMART Mode monitors the performance of the hard drives to predict hard drive failure.

Stripe Size

Stripe size is the maximum number of sectors the RAID system can access without accessing another disk. The stripe size is also the size of the cache for the RAID. A larger stripe is preferable since it reduces the number of I/O requests made to a physical disk and lets the buffer cache work more efficiently.

Slicing

Unlike striping, slicing allows the creation of arrays from a single disk without a loss of speed as the disk fills up. This is because when striping across disks the center of the disk fills up and when it's being written to it slows down. Slicing creates new disk partitions with similar characteristics, therefore keeping the speed the same.

EFI

EFI is a replacement for the original BIOS firmware. Originally developed by Intel it redefines how firmware communicates with the operating system. It contains such information as: platform-related details, boot and runtime service calls.

Appendix B

RAIDGuard X Icons

This chapter details the icons used in this application and their use.

ICON	Description
Main Menu Icons	
	RAIDGuard X Server icon – The icon that is on the desktop and notification area.
	Add / Delete a controller – Select the controller to administer.
	Create / Delete an Array – Change the arrays within the RAID.
	Preferences for additional functions for Array operation – Activate, alarms, mode settings, cache settings, password and controller card time.
	Email – Set the addresses to send e-mail alerts to.
	Option – Set the Slice, expansion, migration, health, disk locking, LUNs and take a snapshot of the array.
Option Menu Icons	
	Slicing an array into several parts
	LUN Map – Assign a LUN to a slice
	Expand an array to larger capacity by adding disks
	Migrate from one RAID level to target RAID level
	Snapshot - Create a backup of a slice
	Health Center - Repair/Maintain Arrays
	Unlock – Fix locked drives

ICON	Description
Application Icons	
	A drive
	A drive belongs to Array 1, 2, 3, 4
	A drive being deleted in Array 1, 2, 3, 4
	A JBOD drive being selected
	JBOD being deleted
	A drive being selected
	An offline drive
	A locked drive
	A drive being selected for expansion / migration / rebuilding
	A transition drive state during the array 1, 2, 3, 4 migration
	A transition drive state during the array 1, 2, 3, 4 migration
	A transition drive state during the array 1, 2, 3, 4 auto-rebuild
	RAID Levels
	easyRAID S8A2-PER2.
	easyRAID S8A2-PETT.

Appendix C

Introduction to RAID levels

The easyRAID S8A2-PETT / easyRAID S8A2-PER2 can support the following RAID levels: 0, 1, 0+1, 5, 6 and JBOD.

Which is the right level for you? The answer depends on the application you use your RAID for.

RAID Level 0 offers high transfer rates, and is ideal for large blocks of data where speed is of importance. Computer Aided Design, Graphics, Scientific Computing, Image and Multimedia applications are all good examples. If one drive in a RAID 0 array fails however, the data on the whole array is lost.

RAID Level 1 may be an appropriate choice if cost and performance are of significantly less importance than fault tolerance and reliability.

RAID Level 0+1 offers a compromise between the reliability and tolerance of level 1 and the high transfer rates provided by level 0.

RAID Level 5 arrays offer high I/O transaction rates, and are the ideal choice when used with on-line transaction processing applications, such as those used in banks, insurance companies, hospitals, and all manner of office environments. These applications typically perform large numbers of concurrent requests, each of which makes a small number of disk accesses. If one drive in a RAID 5 array fails, the lost data can be rebuilt from data on the functioning disks.

RAID Level 6 is similar to RAID level 5. A second set of parity information is written across all the drives. This is equivalent to double mirroring. This level may be more fault tolerant than necessary and has poor performance.

JBOD is a method of arranging multiple disks that is not technically a RAID at all. Under JBOD ("Just a Bunch of Disks") all disks are treated as a single volume and data is "spanned" across them. JBOD provides no fault tolerance, or performance improvements over the independent use of its constituent drives.

This appendix provides a summary of the features of each RAID level to enable users with differing requirements to make the best choice.

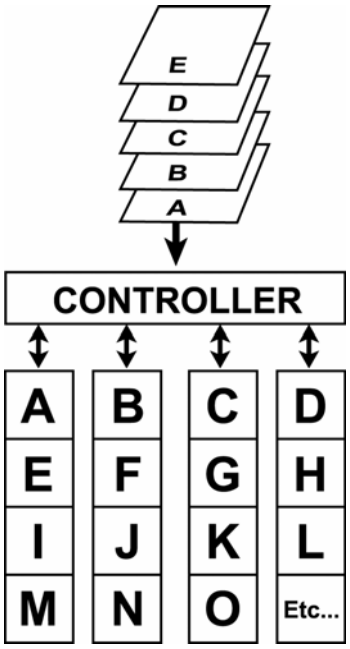
RAID 0

RAID 0 links each drive in the array as one huge drive. Storage capacity is determined by the smallest drive in the array. That capacity is then applied to format all other drives in the array. If using a 40 GB, 60 GB, and 50 GB drive in a RAID 0 array, your system will see one huge drive of 120 GB (40 GB×3).

RAID 0 offers double or more performance under sustained data transfers when one drive per ATA port is used. In such a configuration, unlike Fibre, ATA drives are always available to the system. Fibre requires more management of the Fibre bus.

RAID 0: *Striped disk array without fault tolerance*	
Characteristics: ■ RAID 0 implements a striped disk array, the data is broken down into blocks and each block is written to a separate disk drive. ■ I/O performance is greatly improved by spreading the I/O load across many channels and drives. ■ Fastest and most efficient array type but offers no fault-tolerance. ■ Storage capacity = (No. of disks) × (capacity of smallest disk)	**Recommended use:** ■ Video production and editing ■ Image editing ■ Pre-press applications ■ Any application requiring high bandwidth

The diagram below represents the writing of data on a RAID 0 array composed of four HDDS connected to the controller. Data blocks are distributed across all disks in the array.



Arrangement of data blocks saved on a Level 0 RAID

RAID 1

RAID 1 is commonly referred to as Disk Mirroring, Disk Shadowing or Disk Duplexing as all data is duplicated across both disks. RAID 1 can only be performed with two hard drives (with four drives, RAID 0+1 is configured automatically). As data is identical on both disks, storage capacity is that of the smaller disk. RAID 1 has poor performance for write operations but very high performance for read intensive operations.

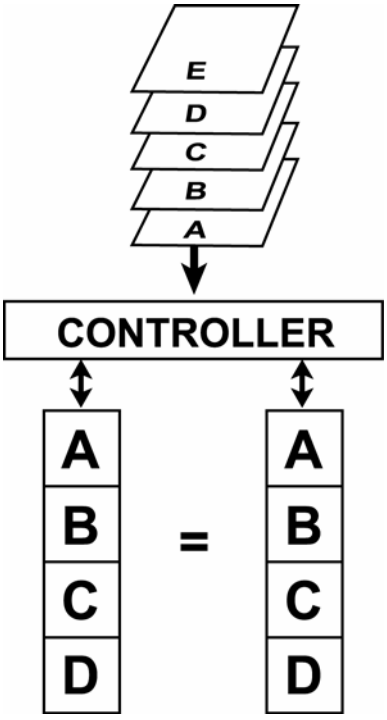
RAID 1: *Mirroring*

Characteristics:

- Better Read transaction rate then single disks, same Write transaction rate as single disks.
- 100% redundancy of data means no rebuild of data is necessary in case of disk failure, just a copy to the replacement disk.
- All the disks have the same data.
- RAID level 1 requires two drives.
- Storage capacity = Capacity of smaller disk

Recommended use:

- Accounting
- Payroll
- Financial
- Any application requiring high availability



Arrangement of data blocks saved on a Level 1 array

RAID 0+1

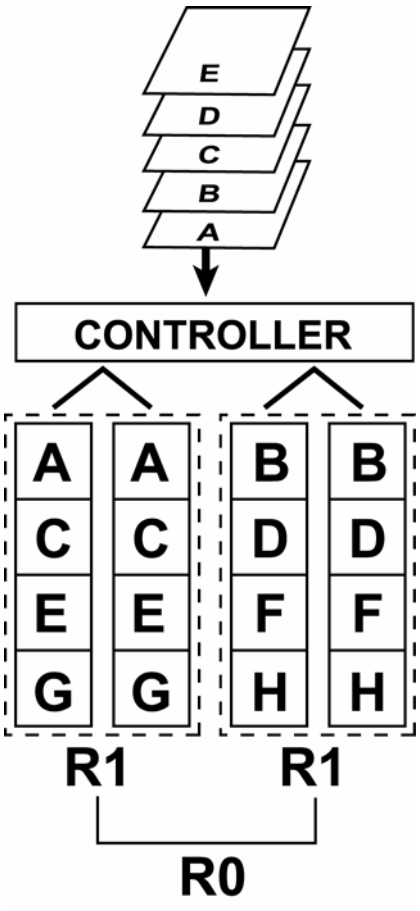
RAID 0+1 combines mirroring and striping functions on a minimum of four hard disks. Mirroring provides full redundancy and protects data in case of multiple drive failure (providing that data on one of each mirrored pair of drives is intact).

RAID 0+1: *Combination of striping and mirroring*

Characteristics:

- This configuration provides optimal speed and reliability.
- Requires even number of disks (minimum 4 disks).

The diagram below represents the writing of data on a RAID 0+1 array composed of four HDDS connected to the controller. The controller creates a RAID 0 array from two RAID 1 sub-arrays.



Arrangement of data blocks saved on a Level 0+1 array

RAID 5

RAID 5 uses a mathematical expression that compares data from two drives and calculates a third piece of data called "parity". Should one of the drives fail, parity data can be used to rebuild the failed data. Under RAID 5, parity data is stored across all drives in the array. This maximizes the amount of storage capacity available from all drives in the array while still providing data redundancy. Data on RAID 5 is block-interleaved.

RAID 5: *Independent data disks with distributed parity blocks*

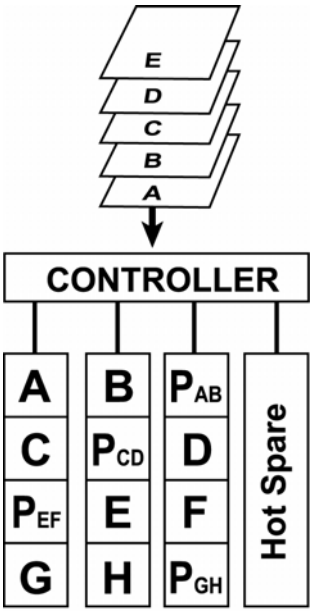
Characteristics:

- Each entire data block is written on a data disk. Parity for blocks in the same rank is generated on Writes, recorded in a distributed location and checked on Reads.
- Highest Read data transaction, medium Write data transaction rate.
- Relatively low ratio of ECC (Parity) disks to data disks means high efficiency (compared to other RAID levels).
- Good aggregate transfer rate.
- Storage capacity = (No. of disks – 1) × (capacity of smallest disk)

Recommended use:

- File and application servers
- Database servers
- WWW, E-mail and News servers
- Intranet servers
- Most versatile RAID level

The diagram below represents the writing of data on a RAID 5 array composed of four HDDS connected to the controller. Parity blocks are represented by the letter P.



Arrangement of data and parity blocks saved on a Level 5 RAID

RAID 6

RAID 6 is stripes blocks of data and parity across an array of drives like RAID 5, except that is calculates two sets of parity information for each parcel of data. The goal of this duplication is solely to improve fault tolerance; RAID 6 can handle at most one fault. Performance-wise, RAID 6 is generally slightly worse than RAID 5 in terms of writes due to the added overhead of more parity calculations, but may be slightly faster in random reads due to spreading of data over one more disk. As with RAID levels 4 and 5, performance can be adjusted by experimenting with different stripe size.

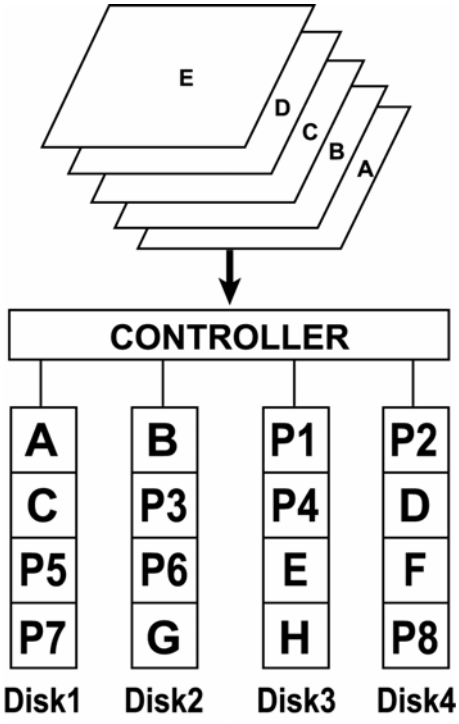
RAID 6: *Independent data disks with double parity blocks*

Characteristics:

- Array Capacity: (size of smallest drive) x (number of drives-2).
- Storage Efficiency: If all drives are the same sizes, then ((number of drives –2) / number of drives).
- Fault Tolerance: very good to excellent.
- Requires a minimum of four drives.

Recommended use:

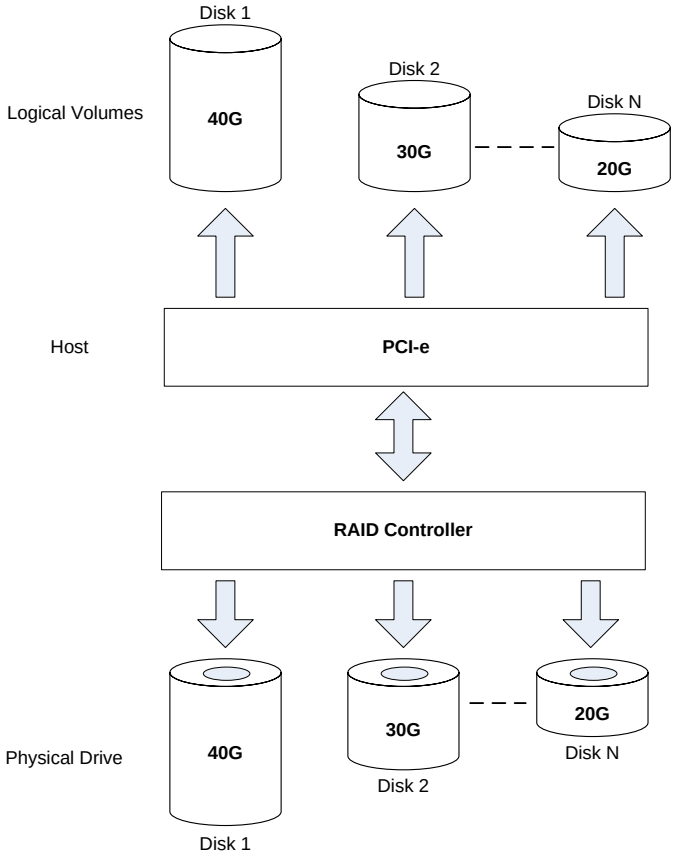
- File and application servers
- Database servers
- WWW, E-mail and News servers
- Intranet servers
- Apply to high reliability servers environment



JBOD

JBOD ("Just a Bunch of Disks") reports the individual drives. The operating system will see each drive in the JBOD mode as a individual drive. There is no RAID protection in the JBOD mode. The JBOD mode allows the user to connect more hard drives without taking up IDE connections on the motherboard.

JBOD: *Spanned disk array without fault tolerance*	
Characteristics: ■ JBOD reports individual disks. ■ No fault-tolerance. ■ Poorer I/O performance than RAID 0 ■ Storage capacity = Sum of constituent drive capacities	**Recommended use:** ■ For most uses not requiring fault tolerance, RAID 0 is better. JBOD has the advantage if you are using several drives of different capacities.



Arrangement of data saved on a JBOD array